Circuits	**Resistors in series and parallel**

Learning objectives	**MUST (6)**	Know the rules for total resistance in series and parallel
	SHOULD (7)	Be able to derive the rules using Kirchoff's Laws and Ohm's Law
	COULD (8/9)	Apply the rules to calculate the total resistance of complex circuits

STARTER: Peer-marking homework questions

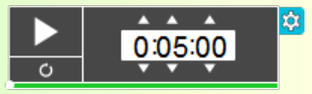
Circuits	**Resistors in series and parallel**
MUST (6)	Know the rules for total resistance in series and parallel

For resistors in series:

$$R_T = R_1 + R_2 + \ldots$$

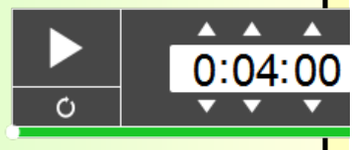
For resistors in parallel:

$$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} \ldots$$

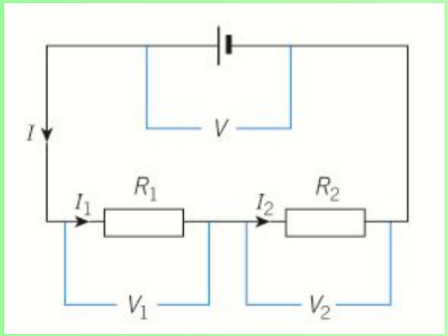


Can you use the equations and rules that we've learned to derive these?

Hint: draw a simple series circuit with two resistors, and apply Kirchoff's second and first laws. You'll need Ohm's law, too. Repeat for simple parallel circuit.

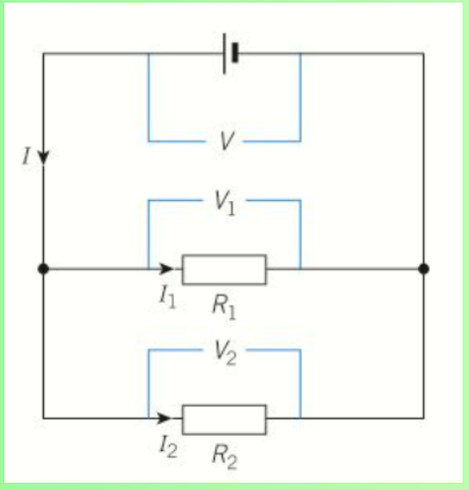


Circuits	**Resistors in series and parallel**
SHOULD (7)	Be able to derive the rules using Kirchoff's Laws and Ohm's Law



Kirchoff's Second Law:

Rewrite, using Ohm's Law:



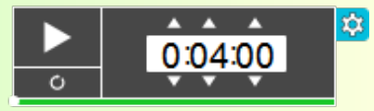
Kirchoff's Second Law:

Circuits	**Resistors in series and parallel**
COULD (8/9)	Apply the rules to calculate the total resistance in complex circuits

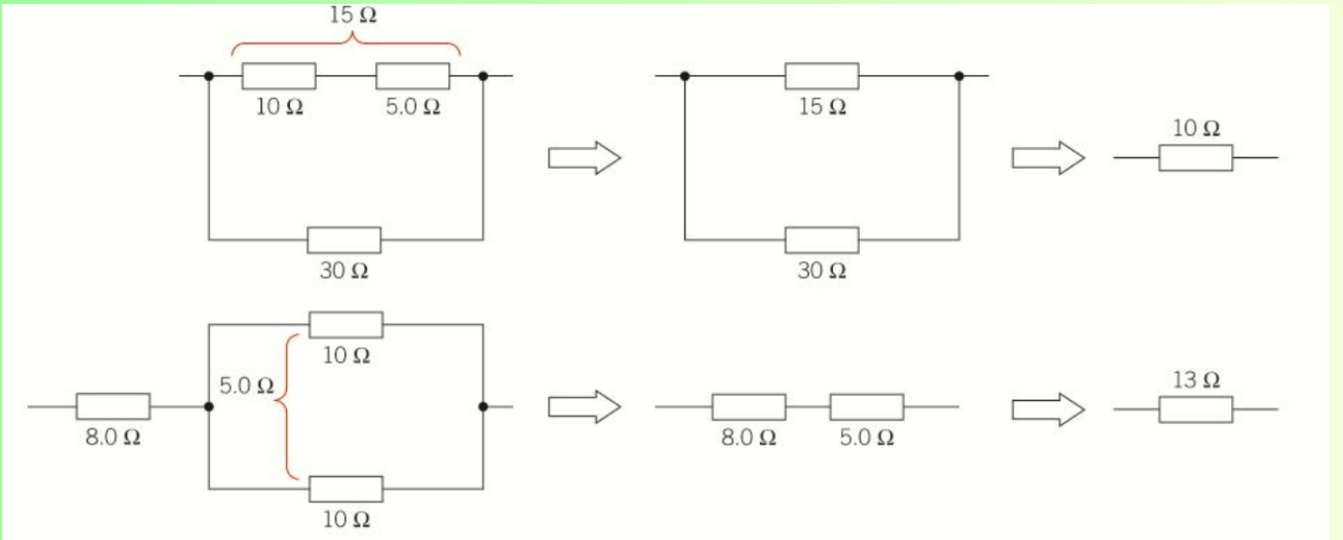
Mini-plenary:

a) I have two identical resistors of xΩ. I put them in series, and then in parallel. What's the total resistance in each case?

b) I have four resistors, all at 10Ω. How many different total resistances could I get from them in a circuit? (I don't have to use them all)



Simplifying circuits:



Circuits	**Resistors in series and parallel**

Learning objectives		
	MUST (6)	Know the rules for total resistance in series and parallel
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PLENARY: When you add an extra resistor in parallel, the total resistance changes.

What's the relationship between the size of the resistor you add and the change in total resistance? Either explain qualitatively or (extension) use a mathematical argument.